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Software Engineering Continuing Education at a Price You Can Afford

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Software is so critical to today's military programs that failure of the software generally results in failure of the program. Hoping for success is the surest way to avoid it. Avoiding software failure is not accidental; it requires careful application of sound software engineering. Whether you are an engineer, a program manager, a contracting officer, or anyone else involved in the development, acquisition, or sustainment of a software-intensive system, the Air Force Institute of Technology's (AFIT) Software Professional Development Program (SPDP) can bring you the education you need to achieve software success¹.

Software is everywhere. It is in our kitchen Appliances; it is in our cars. It allows us to communicate worldwide, and it helps us manage our personnel systems. It is in our weapons systems. Famously, 80 percent of the F-22's functionality is performed in software; some have said that taking a picture of an F-22 is the only thing you can do with it that does not require software [1]. Software is so integral to the F-35 that Lockheed Martin spearheaded the effort to create a safety-critical C++ standard [2]. There is no project in today's military that is not affected by software. Software, like any other technology, has its limitations; as dependent as we have become on software, those limitations become our limitations. Many wonder how we can add armor to our programs' Achilles heels.

Perhaps you were motivated by Secretary Wynne's emphasis on making education a priority in your career [3, 4]. Perhaps you read the National Defense Industrial Association's report on the top defense software engineering issues and are wondering how you can overcome these issues in your program [5]. Perhaps you are simply looking for some job-relevant education to satisfy the Acquisition Professional Development Program continuing education requirements without taxing your unit's travel budget. We are here to help you. We can bring education to your office or home, and we will not charge you or your organization a dime.

The AFIT's SPDP is a distance learning, professional continuing education program designed to benefit the Department of Defense (DoD) organizations and individuals with varying levels of experience and responsibility. SPDP is well into its second decade, but it has been anything but stagnant; we have constantly been adapting to meet the needs of the defense software engineering community. You may have read about SPDP when it transitioned from a resident program to satellite-delivered distance learning program [6, 7]. You may have read about SPDP when it transitioned from satellite delivery to Internet streaming and

from quarter-long courses to month-long courses [8]. Since then, we have been working to improve the education we provide to our students [9, 10].

A typical SPDP course is four weeks long; the lectures are available through Internet streaming or they can be downloaded to view offline. This format has permitted our students to complete courses in a high-paced environment; we have even had students take SPDP courses while deployed

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to Southwest Asia and while at sea. SPDP courses differ from asynchronous Web-based training in many ways. The most significant is that they are instructor-led courses – real, human instructors who provide the lectures (see Figure 1, page 22), complemented with reading assignments from a textbook. We also make use of online discussion boards and sometimes teleconferences to provide continuous instructor-student and student-student interaction. Finally, our students are evaluated with homework assignments and exams.

Available Courses

We currently offer 12 SPDP courses. We have two courses focused on project management:

- CSE 479, Software Project Initiating and Planning.
- CSE 480, Software Project Monitoring and Control.

The software engineering life cycle is cov-

ered in six courses. CSE 481, Introduction to Software Engineering, provides an overview, and each major activity of the software life cycle is covered in greater detail in its own course:

- CSE 482, Software Requirements.
- CSE 483, Software Design.
- CSE 484, Software Implementation.
- CSE 485, Software Systems Maintenance.
- CSE 486, Verification, Validation and Testing.

Our next three courses address object-oriented development:

- CSE 487, Fundamentals of Object-Oriented Systems.
- CSE 488, Modeling Object-Oriented Systems using UML.
- CSE 489, Advanced Analysis and Design of Object-Oriented Systems.

Our final course, CSE 496, Software Engineering Practicum, is a three-week resident course held at our campus near Wright-Patterson AFB, Ohio.

With the exception of CSE 489 and CSE 496, none of these courses have prerequisites. You can choose to take them all or only the ones you are interested in and you can take them in any order. We have committed to offering each of these courses at least once per year, though when demand and faculty resources are in accord, we will provide more frequent offerings.

As stated earlier, a typical SPDP course is four weeks long. Each week, the instructor will provide two lectures and perhaps will hold an optional teleconference. There will be reading assignments and homework assignments. There may be a mid-term exam, and the class will conclude with a final exam.

The atypical courses are CSE 489 and CSE 496, as these are project-based courses. CSE 489 is still a four-week, instructor-led course, but there is only one lecture per week and one mandatory teleconference in which the students present project progress. Enrollment in CSE 489 requires completion of CSE 487 and CSE 488. CSE 496 is a three-week resident course in which stu-



Figure 1: The author teaches CSE 489 while attending the 2006 Systems and Software Technology Conference.

dents form a development team and have the opportunity to apply what they have learned; before enrolling in CSE 496, a student must have completed at least seven other SPDP courses.

Certifications

AFIT offers four certifications to help you mark your progress through SPDP and to help you demonstrate that you have taken a breadth of courses. The Software Engineering Management Certificate is awarded in recognition of successful completion of topics related to software project management and the individual components of the software life-cycle model; it will be awarded for the completion of CSE 479, CSE 480, and CSE 481. The Software Lifecycle Development Certificate is awarded in recognition of a more in-depth study of each of the phases of the software life cycle; it will be awarded after the successful completion of CSE 482, CSE 483, CSE 484, and CSE 485. The Advanced Software Development Certificate is awarded after the successful completion of CSE 486, CSE 487, and CSE 488, in recognition of these analysis, modeling, and testing topics. Finally, the Technical Software Development Certificate is awarded after the successful completion of CSE 489 and CSE 496, in recognition of completing the project-centered courses in the program.

Besides the AFIT certifications, SPDP can help you toward another credential. AFIT's School of Systems and Logistics is one of seven registered educational providers worldwide for the Institute of Electrical and Electronics Engineers (IEEE) Computer Society's Certified Software Development Professional (CSDP) program [11]. The CSDP certification is the only software development certification that has all of the components of a professional certification: an exam demon-

strating mastery of the Software Engineering Body of Knowledge (SWE-BOK), an experience base, and continuing education. While taking the SPDP courses is neither sufficient nor necessary to earn the CSDP, completing the curriculum will fully immerse you in the SWE-BOK, preparing you for the CSDP exam.

Eligibility

SPDP classes are funded through AFIT for all DoD employees (active duty and reserve component service members and government civilians). Contractors and employees of other US. Government Agencies may also enroll in SPDP courses on a space-available basis. There is no tuition charged for SPDP courses, and AFIT provides textbooks free to DoD employees. Contractors and non-DoD government employees are responsible for procuring their own textbooks prior to the beginning of a course offering.

Nobody wants to be another statistic for the next study of defense software crises. You can mitigate this risk by arming yourself with software engineering knowledge and skills. Fortunately, with the SPDP, you will not need to dig into your tight travel funds and you will not need to figure out how to pay for expensive continuing education courses. Our faculty is here to help. The feedback we have received from our students and their supervisors is that they usually see improvement during their current projects.

If you are interested in taking SPDP courses, or at least curious, please visit the SPDP Web site at <www.afit.edu/ls/spdp/>, e-mail the faculty at <spdp@afit.edu>, or contact Candace Barker at (937) 255-7777 ext. 3319, or DSN 785-7777 ext. 3319. ♦

Note

1. The views expressed in this article are those of the author and do not reflect the official policy or position of the Air Force, DoD, or the U.S. Government.

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